

AMENDMENT TO THE CLAIMS:

Please amend claims 1, 4-6, 10 and 16-18 as follows:

1. (Currently amended) A method for processing data to provide a forewarning of a critical event, comprising:

acquiring a plurality of sets of data for ~~at least one~~ a plurality of channels of data for at least one test subject or process;

calculating a set of channel data for a selected parameter from the plurality of channels of data representing parameters that are calculated to provide the selected parameter;

computing a renormalized measure of dissimilarity from distribution functions derived from a phase space for each ~~respective~~ the selected channel of data;

comparing said renormalized measure of dissimilarity to a threshold ( $U_c$ ) for a number of occurrences ( $N_{occ}$ ) to indicate a condition change in said renormalized measure of dissimilarity; and

detecting a simultaneous condition change in a plurality ( $N_{sim}$ ) of renormalized measures of dissimilarity to determine a forewarning of the critical event, ~~and~~

~~wherein said one channel of data corresponds to a parameter that is calculated from a plurality of parameters corresponding to a plurality of channels of data.~~

2. (Original) The method of claim 1, wherein the test subject is a human patient.

3. (Original) The method of claim 1, wherein the test subject is a mechanical device or physical process.

4. (Currently amended) The method of claim 1, wherein the selected parameter ~~process indicative data~~ is three-phase electrical power.

5. (Currently amended) The method of claim 1, wherein the

selected parameter ~~process indicative data~~ is vibration mechanical power.

6. (Currently amended) The method of claim 1, wherein the selected parameter ~~process indicative data~~ is a difference between two channels of EEG data.

7. (Original) The method of claim 1, further comprising:  
performing a first filtering of each set of data with a zero-phase quadratic filter that filters out high-frequency artifacts; and

performing a second filtering of each set of data with a zero-phase quadratic filter to filter out low-frequency artifacts.

8. (Original) The method of claim 1, further comprising:  
sorting the data values into ascending order from a minimum to a maximum;

determining the number of unique signal values ( $n$ ) and the corresponding relative occurrence frequency ( $F_k$ ) for each unique signal value ( $v_k$ );

displaying a graph of frequency ( $F_k$ ) versus values ( $v_k$ ) in each bin in a connected phase space; and

discarding data that has  $[v_k - (N/n)]/\sigma_3 > z$ , where the value of  $z$  is determined by solving  $1/n = \frac{1}{2} \operatorname{erfc}(z/\sqrt{2})$ , and  $\sigma_3$  is the standard deviation in the occurrence frequency.

9. (Original) The method of claim 1, with an alternative embodiment for event forewarning, comprising determining a sequence of renormalized phase space dissimilarity measures from data sets for the test subject or process; summing said renormalized measures into a composite measure,  $C_i$ , for the  $i$ -th data set; performing a least-squares analysis over a window of  $m$  points of the said composite measure to obtain a straight line,  $y_i = ai + b$ , that best fits said composite data in a least-squares

sense; determining the variance,  $\sigma_1^2 = \sum_i (y_i - C_i)^2 / (m-1)$ , of said composite measure with respect to the straight line fit; obtaining the variability of the sequel window of  $m$  sequential points via the statistic,  $G = \sum_i (y_i - C_i)^2 / \sigma_1^2$ ; comparing said value of  $G$  to the running maximum value of the same statistic,  $G_{\max}$ ; determining the forewarning of or failure onset of a critical event (such as a machine failure), when  $G$  is significantly more than  $G_{\max}$ ; obtaining the ratio,  $R = (G_{\max})_k / (G_{\max})_{k-1}$ , of the present and previous running maximum in  $G$ ; and determining the forewarning of a critical event when  $R$  is significantly more than some limit.

10. (Currently amended) A method for processing data to provide a forewarning of a critical event, comprising:

acquiring a plurality of sets of data for at least two channels of data for at least one test subject or process;

producing a set of multi-channel data representing a combination of said at least two channels of data;

computing ~~to~~ a multi-channel time-delay phase-space (PS) construction, which has the form:  $y(i) = [s(1)_i, s(1)_{i+\lambda}, s(1)_{i+2\lambda}, \dots, s(2)_i, s(2)_{i+\lambda}, s(2)_{i+2\lambda}, \dots, s(c)_i, s(c)_{i+\lambda}, s(c)_{i+2\lambda}, \dots]$ , where  $s(c)$  denotes the symbolized data for  $c$ -th channel;

computing a renormalized measure of dissimilarity from distribution functions derived from the ~~(non)-connected~~ phase space for the multi-channel ~~of~~ data;

comparing said renormalized measure of dissimilarity to a threshold ( $U_c$ ) for a number of occurrences ( $N_{occ}$ ) to indicate a condition change in said renormalized measure of dissimilarity; and

detecting a simultaneous condition change in a plurality ( $N_{sim}$ ) of renormalized measures of dissimilarity to determine a forewarning of the critical event.

11. (Original) The method of claim 10, further comprising:  
performing a first filtering of each set of data with a

zero-phase quadratic filter that filters out high-frequency artifacts; and

performing a second filtering of each set of data with a zero-phase quadratic filter to filter out low-frequency artifacts.

12. (Original) The method of claim 10, using an alternative embodiment for event forewarning, comprising determining a sequence of renormalized phase space dissimilarity measures from data sets collected during increasingly severe fault conditions; summing said renormalized measures into a composite measure,  $C_i$ , for the  $i$ -th data set; performing a least-squares analysis over a window of  $m$  points of the said composite measure to obtain a straight line,  $y_i = ai + b$ , that best fits said composite data in a least-squares sense; determining the variance,  $\sigma_1^2 = \sum_i (y_i - C_i)^2 / (m-1)$ , of said composite measure with respect to the straight line fit; obtaining the variability of a sequel window of  $m$  sequential points via the statistic,  $G = \sum_i (y_i - C_i)^2 / \sigma_1^2$ ; comparing said value of  $G$  to the running maximum value of the same statistic,  $G_{\max}$ ; and determining the onset of a critical event, such as forewarning of a machine failure, when  $G$  is significantly more than  $G(\text{non-end-of-life})$ , or when  $R$  is significantly more than  $R(\text{non-end-of-life})$ , or detection of failure onset when  $G$  is significantly greater than  $G(\text{end-of-life})$ .

13. (Original) The method of claim 10, wherein the test subject is a human patient.

14. (Original) The method of claim 10, wherein the test subject is a mechanical device or physical process.

15. (Original) The method of claim 10, further comprising: sorting the data values into ascending order from a minimum to a maximum;

determining the number of unique signal values ( $n$ ) and the corresponding relative occurrence frequency ( $F_k$ ) for each unique signal value ( $v_k$ );

displaying a graph of frequency ( $F_k$ ) versus values ( $v_k$ ) in each bin in a connected phase space; and

discarding data that has  $[v_k - (N/n)]/\sigma_3 > z$ , where the value of  $z$  is determined by solving  $1/n = \frac{1}{2} \operatorname{erfc}(z/\sqrt{2})$ , and  $\sigma_3$  is the standard deviation in the occurrence frequency.

16. (Currently amended) The method of claim 10, wherein the multi-channel time-delay phase-space (PS) construction is constructed from process-indicative data, which is three-phase electrical power data.

17. (Currently amended) The method of claim 10, wherein the multi-channel time-delay phase-space (PS) construction is constructed from process-indicative data, which is vibration mechanical power data.

18. (Currently amended) The method of claim 10, wherein the multi-channel time-delay phase-space (PS) construction is constructed from process-indicative data representing a difference between the two channels of EEG data, which is EEG data.